

PARACYMORIZA.

Type *P. vagalis*, Wlk. (*Oligostigma*).

The above generic name is proposed for Lederer's *Cymoriza*, the species of which are by no means congeneric with Guenée's original genus of the same name.

LIX.—On the Fossil Fishes found at Achanarras Quarry, Caithness. By R. H. TRAQUAIR, M.D., F.R.S.

ABOUT a mile to the west of the well-known pavingstone quarries of Spital Hill, and nearly three miles south of Halkirk, in Caithness, is the summit of a lesser elevation, the Hill of Achanarras; and on the slope of this hill, very near the top, is a small quarry, the fossil fish-remains occurring in which form the subject of the present short communication.

The comparatively few feet of rock exposed in this quarry afford a remarkable assemblage of fossil fishes, specimens of which do not occur in the older collections from the Scottish Old Red Sandstone; and, so far as I am aware, Achanarras as a locality for such remains has hardly yet been noticed in print*.

The first intimation I had of the existence of this locality was from Dr. Marcus Gunn, a Caithness man, but now a well-known London oculist, who some years ago brought me some specimens of a strange little fossil vertebrate from the quarry in question, which some who had seen it were inclined to compare to a "baby *Coccosteus*." Subsequently Dr. Gunn's cousin, Mr. John Gunn, Assistant Secretary to the Royal Physical Society of Edinburgh, brought some additional specimens to the Museum of Science and Art, among which were fragments of *Rhadinacanthus longispinus* (Ag.) and *Dipterus Valenciennesii* (Sedgw. & Murch.). From the Messrs. Gunn I learn that the quarry was first opened in 1874.

After this I began to be able to recognize specimens of fishes from Achanarras by the peculiar mineral character of the rock in which they are imbedded, which is unlike that of

* The only reference which I have seen to Achanarras as a locality for fossil fishes is contained in a short paper by Mr. John Gunn, "On the Rocks of Central Caithness," Brit. Assoc. Report, 1885, p. 1030. He observes that "at Achanarras a curious fossil *Coccosteus* is found in a small slate quarry."

any other fish-bearing schist with which I am acquainted, and to observe that they were finding their way into collections, even in London, though without the precise locality being indicated. In the autumn of 1889 Achanarras was visited by the officers of the Geological Survey of Scotland, and I have received the kind permission of the Director-General to examine a collection of fishes from it, presented to the Survey by the Thurso Flagstone Quarrying Company, who are the lessees of the quarry. It was not, however, until the month of August of the present year that I had myself the opportunity of visiting the spot. On this occasion, when on a visit to Mr. Gunn and his family at Dale, which is about two miles from Achanarras, I spent several days exploring the débris of the quarry, and, besides many specimens of the "baby *Coccosteus*" (*Palæospondylus Gunnii*), Mr. Gunn and I discovered three examples of *Diplacanthus striatus*, a species rare in the Caithness beds, besides several specimens of a species of *Mesacanthus* and other fishes. Shortly afterwards I received, for the Natural History Department of the Museum of Science and Art, a large donation of Achanarras fishes from the Thurso Flagstone Quarrying Company.

I must also acknowledge my indebtedness for material to Mr. James Reid, of Allan House, Blairgowrie, who for some years back has greatly interested himself in collecting the fossil fishes and plants of the Old Red Sandstone, and to Mr. Munro, of Achanarras Farm; and I have carefully looked through the collection made by Mr. Edwards, of Leigh, near Manchester, at present deposited in the museum at Owens College.

List.

1. *Dipterus Valenciennesii* (Sedgw. & Murch.)
2. *Mesacanthus*, sp.
3. *Cheiracanthus Murchisoni*, Ag.
4. *Diplacanthus striatus*, Ag.
5. *Rhadinacanthus longispinus* (Ag.).
6. *Pterichthys Milleri*, Ag.
7. *Coccosteus decipiens*, Ag.
8. *Homosteus Milleri*, Traq.
9. *Glyptolepis paucidens* (Ag.).
10. *Osteolepis macrolepidotus*, Ag.
11. *Diplopterus Agassizii*, Traill.
12. *Cheirolepis Trailli*, Ag.
13. *Palæospondylus Gunnii*, Traq.

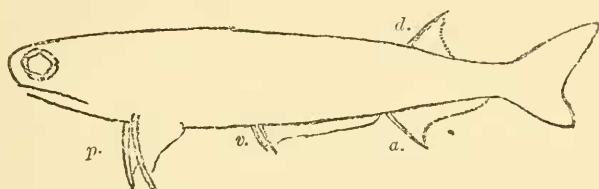
Remarks on the foregoing Species.

1. *Dipterus Valenciennesii*.—This is by far the most common fish at Achanarras, and, so far as the external characters of the species are concerned, the specimens are the most beautiful which I have seen from any locality in Scotland. They occur from 6 to 15 inches in length.

2. *Mesacanthus*, sp.—Specimens of a small *Mesacanthus* are not uncommon, but hardly in a sufficiently good state of preservation for accurate identification as to species. In size and the commonly twisted or contorted condition of the body they resemble *M. pusillus*, Ag., of the Moray-Firth beds.

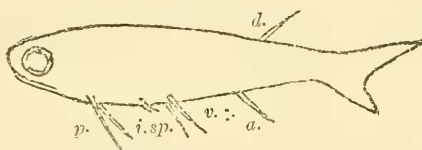
The genus *Mesacanthus* was instituted by myself in 1888* for those small species previously referred to *Acanthodes* (*A. pusillus*, Ag., *A. Mitchelli*, Eg., *A. Peachii*, Eg.) which,

Fig. 1.



Outline of *Acanthodes sulcatus*, Ag., much reduced.
p, pectoral spines; v, ventral spines; a, anal; d, dorsal.

Fig. 2.



Outline of *Mesacanthus Mitchelli*, Eg., natural size.
i. sp., intermediate spines; the other letters as in fig. 1.

though resembling that genus in having one dorsal spine placed posteriorly to the anal, have in addition a pair of minute intermediate spines on the belly between the pectoral and ventral ones. Messrs. Smith Woodward and Sherborn have, however, in their recently-published 'Catalogue of

* Geol. Mag. dec. iii. vol. v. p. 511.

British Fossil Vertebrata,' rejected *Mesacanthus* as a genus, and restored its species to *Acanthodes*.

I take this opportunity of expressing my dissent from this view, and to point out that, although the presence of intermediate ventral spines is to my mind quite sufficient for generic distinction, it is not the only important difference between those Old Red species and the true *Acanthodes* of the Carboniferous and Permian formations. A glance at the outlines of *Acanthodes* and *Mesacanthus* given in figures 1 and 2 will suffice to bring out the following remarkable distinctions in the position of the fin-spines. In *Acanthodes* the dorsal and anal spines are situated proportionally nearer the caudal fin than in *Mesacanthus*, while the ventral spines are small and situated remotely from the anal, so that the ventral fin itself forms a long low fringe; while in *Mesacanthus*, on the other hand, the ventral spines are nearly as large as the anal, and situated considerably nearer to it than to the pectorals. The remarkable fact is therefore that in *Mesacanthus* it is the small intermediate spines, and not those usually reckoned as "ventral," which correspond in size and position to the ventral spines in *Acanthodes*, the idea being indeed almost suggested that in the former genus the additional spines are the posterior and not the anterior pair situated on the belly. I do not propose to maintain such a theory, but certainly I must hold that the larger size and different position of the ventral spines, together with the presence of the intermediate pair, are ample grounds for the generic separation of *Mesacanthus* from *Acanthodes*.

3. *Cheiracanthus Murchisoni*, Ag.—Several specimens of a *Cheiracanthus* have occurred which I refer to *Ch. Murchisoni* on account of the form and proportional size of the spines, though the scale-ornament is not preserved.

4. *Diplacanthus striatus*, Ag.—Three specimens clearly identifiable with this, the common *Diplacanthus* of the Orkney as well as of the Moray-Firth beds.

5. *Rhadinacanthus longispinus* (Ag.).—Several fragments showing the characteristic spines and scale-ornament.

Messrs. Woodward and Sherborn have in their work already quoted also rejected the genus *Rhadinacanthus* which I proposed for the *Diplacanthus longispinus* of Agassiz on account of the apparent absence of the second or inner pair of pectoral spines, which are so conspicuous in the typical

D. striatus. Mr. Smith Woodward has since pointed out to me that in one specimen of *longispinus* from Gamrie, in the British Museum, a rudimentary second pectoral spine is present; but, considering the small size of this projection from the pectoral arch and the difference in the shape and sculpture of the other spines, I do not yet see my way to retracting the genus.

6. *Pterichthys Milleri*, Ag.—So far as I am aware no true *Pterichthys* has hitherto been recorded from the Caithness beds, as the *Pterichthys Dickii* of C. W. Peach, from John o' Groats, has been referred by me to another genus, *Microbrachius*. But there can be no doubt as to the identity of the Achanarras specimens with the common *Pterichthys* of the Orkney and Moray-Firth beds, in which must also be included *Pt. testudinarius*, Ag., *cornutus*, Ag., *latus*, Ag., and *quad-ratus*, Egert.

7. *Coccosteus decipiens*, Ag.—Detached plates of this species are common in many other localities in Caithness; but from no place in the whole of Scotland have I seen specimens which display the general configuration of the fish to better advantage. If a pectoral spine or "Ruderorgan" existed in *Coccosteus*, such as Prof. von Koenen thinks may yet be found in Scotch specimens, surely it could not fail to be seen in those from Achanarras. But not even a suspicion of such an appendage can be detected.

8. *Homosteus Milleri*, Traq.—A large but rather disturbed specimen of this from Achanarras is contained in the collection of the Geological Survey of Scotland.

9. *Glyptolepis paucidens* (Ag.).—Remains of this, the common *Glyptolepis* of the Caithness beds, are not uncommon in the quarry at Achanarras, one entire specimen in the Edinburgh Museum measuring 24 inches in length and having the acutely lobate pectorals beautifully displayed. There can be no doubt that this species is closely allied to the *G. leptopterus*, Ag., of the Moray-Firth beds; but the lanian teeth of the latter, so far as I can ascertain, seem to be rounded in section up to nearly the tip, while those of *G. paucidens* become acutely trenchant very soon above their base.

10. *Osteolepis macrolepidotus*, Ag.—In my paper on the

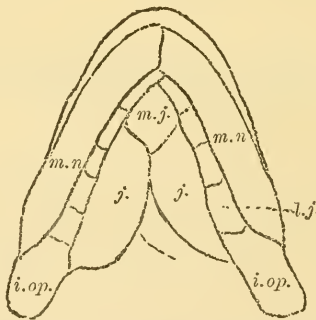
nomenclature of the fishes of the Old Red Sandstone I stated that I had never convinced myself of the occurrence of this species in Caithness at all; and there can be no doubt that the *Thursius macrolepidotus* (Sedgw. & Murch.) of the Thurso beds has often been mistaken for it. From Achanarras, however, two specimens—one in the Edinburgh Museum, the other in my own collection—are undoubtedly referable to *Osteolepis macrolepidotus*, Ag., which may be easily distinguished from the smaller *O. microlepidotus*, Pander, by the more oblong form of the cephalic shield and the more acute angle formed by a V-shaped sensory groove immediately behind the pineal foramen. *O. macrolepidotus* is the species characteristic both of the Orkney flags and of the Moray-Firth nodules.

11. *Diplopterus Agassizii*, Traill.—In Mr. Edwards's collection, at present exhibited in the Owens College Museum, there is a specimen of *Diplopterus Agassizii* evidently from Achanarras. It is merely an impression of a fish lying upon its back, yet shows at least one point of interest.

In a paper on *Megalichthys* published some years ago I stated that "Although omitted in Miller's and Pander's figures lateral jugular plates are undoubtedly present in *Osteolepis* and *Diplopterus* as well as in *Megalichthys*"*.

In no specimen of *Diplopterus* have I seen the lateral jugulars better marked than in the one here referred to, the

Fig. 3.



Under surface of the head of *Diplopterus Agassizii*, reduced one third.
m.n., mandible; *i.op.*, interoperculum; *j.*, principal jugular; *m.j.*, median jugular; *l.j.*, lateral jugular plates.

head of which I have represented in outline in fig. 3. Here it will be seen that they are not symmetrical on the two sides,

* Geol. Mag. (3), vol. i. 1884, p. 117.

there being five on the right and only four on the left. They are proportionally narrower than in *Megalichthys*, but not so narrow as in *Osteolepis*.

12. *Cheirolepis Trailli*, Ag.—Two specimens of this from Achanarras are in the Museum of Science and Art, and one in the collection of the Geological Survey, and I also observed some fragments of the same species in the débris of the quarry. I have no hesitation in referring these specimens, the first of the genus ever observed in Caithness, to the same species as that which is so common in the Orkney as well as in the Moray-Firth beds.

13. *Palæospondylus Gunnii*, g. et sp. n. (fig. 4, magnified).—This is hitherto the only novelty which has turned up in the quarry, and it is of excessive interest, though unfortunately it must take its place among the fossil fishes *incertæ sedis*. It might indeed be asked, Where is the evidence that it is even a fish? though there is no doubt of its being a Vertebrate.

This little organism varies from 1 to 1½ inch in length, of which measurement the head occupies about a fifth. Little can be made out of the structure of the head, which looks like a flat crushed mass of bony bars; it is a little longer than broad, with a slight lateral hour-glass constriction, rounded in front and truncate behind; from the front two small, short, pointed processes project, one on each side, like a pair of little feelers, while behind a little shield-like body passes back over the first three or four vertebræ. Nothing at all comparable to jaws, upper or lower, can be seen. The vertebral axis, which passing back from the head becomes attenuated to a fine point posteriorly, is composed of distinctly ossified and separate vertebral centra, which, however, appear to me to be hollow or ring-like, as in *Chondrenchelys* &c. In the anterior two thirds of the vertebral column the neural arches are distinctly seen in the type specimen, but they are not furnished with prominent spines; but in the latter third very slender obliquely-directed spines make their appearance both neurally and hamally.

Not the smallest trace of limbs has been seen in any specimen.

Fig. 4.



Palæospondylus Gunnii,
Traqu., twice nat. size.

It is very difficult to give an opinion on the affinities of this strange little organism, except that it is a Vertebrate and probably a fish. It is certainly not a Placoderm, its resemblance to a supposed "baby *Coccosteus*" being entirely deceptive. The appearance of the head does remind us in a strange way of the primitive skull of *Myxine*, a resemblance which is rendered still more suggestive by the apparent complete absence of lower jaw or of limbs or limb-girdles. But a Myxinoid with ossified skeleton including differentiated vertebral centra is, it must be owned, a rather startling idea! But as it requires a name in the meanwhile, I cannot think of any one more appropriate than *Paleospondylus Gunnii*.

LX.—*The Fauna of Amber*. By Herr RICHARD
KLEBS, of Königsberg*.

THE above is the title of a paper read before the Entomological Section of the 'Versammlung deutscher Naturforscher und Aertzte,' at Heidelberg, on Sept. 21, 1889. With a view to obtaining a large amount of material thoroughly suitable for working, Herr Klebs had communicated with Messrs. Stantien and Becker, of Königsberg, who enjoy the monopoly of the amber trade, and who placed their entire stock at his disposal. The result has been that during the last twelve years several hundred thousand pieces containing specimens have passed through his hands, and of these he has arranged and catalogued about twenty-five thousand of the best-preserved and most valuable. In addition to this Herr Klebs has arranged and catalogued other collections, including that formed by Künow, which comprises twelve thousand specimens, and has recently been purchased by the Prussian government.

Thirty years ago a paper was read by Löw before the same society on the Dipterous fauna of amber. Unfortunately it was but a passing glimpse which Löw was able to give of the Tertiary forms of this order of insects, which attained so high a degree of development during that period; and Löw died before completing his work. But what little he then communicated excited general interest. Herr Klebs instances the genera *Electra* and *Chrysothemis*, which are

* Condensed from the 'Biologisches Centralblatt,' Bd. x. nos. 13 and 14, pp. 444-448, August 15, 1890.